Vice-president and Chairman of the Section—E. B. Wilson, Columbia University.

Secretary—C. Judson Herrick, University of Chicago.

Member of the Council—C. H. Eigenmann, Indiana University.

Member of the General Committee—G. E. Coghill, Denison University.

Sectional Committee—E. B. Wilson, vice-president, 1908; E. G. Conklin, vice-president, 1907; C. Judson Herrick, secretary; Frank Smith, one year; W. E. Ritter, two years; A. W. Bleile, three years; A. L. Treadwell, four years; C. C. Nutting, five years.

At the business session of the Central Branch of Zoologists the following officers were elected:

President—E. A. Birge, University of Wisconsin.

Vice-president—M. F. Guyer, University of Cincinnati.

Secretary-Treasurer—H. H. Newman, University of Michigan.

Member of the Executive Committee for Three Years—C. M. Child, University of Chicago.

The following were elected to membership in the Central Branch: Oscar Riddle, V. E. Shelford, W. S. Miller, A. W. Meyer, James A. Nelson, C. J. Herrick.

Thomas G. Lee,
Secretary

University of Minnesota

SCIENTIFIC BOOKS

A First Course in the Differential and Integral Calculus. By William F. Osgood, Professor of Mathematics in Harvard University. Pp. xv + 423. New York, The Macmillan Company. 1907.

First Course in Calculus. By E. J. Townsend, Professor of Mathematics in the University of Illinois, and G. A. Goodenough, Associate Professor of Mechanical Engineering in the University of Illinois. Pp. x + 466. New York, Henry Holt and Company. 1908.

A Course in Mathematics for Students of Engineering and Applied Science. By Frederick S. Woods and Frederick H. Bailey, Professors of Mathematics in the Massachusetts Institute of Technology. Vol. I. Pp. xii + 385. Boston, Ginn and Company. 1907.

Graphic Algebra. By Arthur Schultze, Assistant Professor of Mathematics, New York University, and Head of the Department of Mathematics, High School of Commerce, New York. Pp. viii + 93. New York, The Macmillan Company. 1908.

A Treatise on the Integral Calculus founded on the Method of Rates. By William Woolsey Johnson, Professor of Mathematics at the United States Naval Academy, Annapolis, Maryland. Pp. v + 440. New York, John Wiley and Sons. 1907.

People who have to do with mathematics fall temperamentally into three classes. There are the theorists. These are interested in doctrines as doctrines. They find their joy in the construction and the understanding of them, and have but little personal interest in applications and utilities, or none at all. The theorist is a lover of logic, of the abstract and the recondite, of pure creations of the intellect. For him a mathematical doctrine is a work of art, of art that is supersensuous, and a theory is valuable in proportion as it is beautiful. In sharpest contrast with the theorists stand the practicians. These despise theory as such, sometimes denying the fact, sometimes admitting it and occasionally avowing it even boastfully. They look upon mathematics as a mere tool, as a spade or a wheelbarrow. The practician is not a man of science, strictly speaking, and he is not an artist. He is an artisan, not an artisan of high type, indeed, nor yet entirely useless. He is allied to the theorist very much as the splitter of rails or the painter of a barn is allied to a sculptor, a creative musician or a master of color and design. The theorist and the practician are organically antagonistic in temperament. The former comprehends the latter as the greater includes the less. The theorist contemns mere practise and avoids it, but he does so deliberately from a knowledge of values and relative worths. The practician hates theory and avoids it, but he does so from necessity, by the "virtue of impotence." The differences between them, be-

ing organic and fundamental, can be neither composed nor annulled. Fortunately for an age that glories in possessing and is bent on advancing a material civilization that theorists never would and that practicians never could produce, there is a third class among those who have to do with mathematics, a class composed of two groups of men: a group interested primarily in theory, in mathematics as a science, yet having a strong secondary interest in applications, in practise, in mathematics as a tool; and another group chiefly interested in practise that involves applications of mathematics, but having at the same time a potent secondary interest in the subject as a science, as a body of consistencies, an ensemble of coherent doctrines. The latter group, the engineers, tend to keep mathematics sane, serviceable, attached to reality, adapted to the needs of the surveyor, the miner, the excavator, the bridge-builder, and the rest; the former group, comprising most of the professional mathematicians and the teachers of mathematics, serve to save the science from degenerating into a mere drudge, and by extending its structures far above the conscious needs of man, make it an everlasting monument to his dignity and an honor to his spirit. Thus the interests of these two groups, unlike those of the theorist and the practician, intersect; and as there is the need of better cooperation between the groups, there is also, by virtue of their community of temperament, the possibility of securing it. The engineer says to the teacher of mathematics: "Make your science more serviceable, lay bare its instrumental significance, teach us how to use it." The teacher replies: "Your demand is just and reasonable, but you should understand that the application of a difficult doctrine to a difficult concrete problem presupposes an understanding of the doctrine as a doctrine and that such understanding requires native ability and prolonged study." As a reasonable man, the engineer must admit that the teacher, too, is right. What, then, is to be done? The answer is: compromise.

How to effect the compromise to the best advantage of all the interests involved—the integrity of the science itself, the insistent claims of the technologist, the indubitable rights of those who pursue the study of mathematics solely as a discipline and especially of those rarer spirits who hope to make it the object of a life's devotion—that is the question that presses upon the teachers of mathematics in our day and that, owing to the familiar rapid multiplication of technological schools, presses especially hard upon teachers of the calculus. In Professor Osgood's book culminate the efforts of nearly a generation of mathematicians to produce a beginner's calculus that shall be both rigorous and understandable, theoretic enough to be scientific and sufficiently practical for the student of engineering, not too spiritless for those whose aim is liberality of culture and yet adequate as a preparation for the intending student of still higher disciplines. For directness and simplicity of presentation, clearness and correctness of statement, judicious accentuation and ordering of topics, and for the happy mingling of the concrete and particular with the abstract and general, this work attains a level of excellence not likely to be soon surpassed. The author estimates that the time required for covering the matter of the book corresponds roughly to a five-hour course throughout one year. The estimate is based, however, upon the lecture method of presentation. In the case of lectures adapted to undergraduates, this method, whatever be its compensatory advantages, is undoubtedly less rapid than that of assigning definite lessons and requiring recitations upon them. By employing the latter method of instruction and by omitting the chapter of about forty pages devoted to mechanics—an omission entirely practicable in a considerable number of institutions that provide a separate course in elementary mechanics to follow the calculus—it would seem to be possible to cover the remainder of the matter fairly well in a three-hour year course or even in a five-hour half-year course. Indeed, if one make the mentioned omission, the remainder of the book, owing to wider margins and other physical features, only appears to contain more reading matter than such a book, for example, as Osborne's revised "Calculus," and this last, as experience has shown, can be

mastered in a three-hour course of one year. In view of the high excellence of the book one hesitates to note so minor an infelicity as the recurring phrase, tangent *in* a point; or to query why the notion of limit is not defined instead of being presupposed; or to question the scientific or the didactic value of the cautionary note (p. 5), for while it is true that two coincident points of a curve do not determine a secant, is it not also true that, if P be a point of a curve admitting a tangent T at P and if P' be a second point of the curve, the secant PP', if P' move along the curve into coincidence with P, at the same time rotates about P into the definite position of coincidence with T? The tangent T is not, indeed, then determined by the mere coincidence of P and P', but by that *coincidence regarded as having resulted from P' moving along the curve.*

Professors Townsend and Goodenough's "Course" is a notable contribution to the text-book literature of the calculus. It is too large by a hundred pages to admit of the satisfactory presentation of the whole of it in the time usually allotted to the subject even in the best schools. The thickness of the volume is partly due, however, to the presence of a chapter dealing with ordinary differential equations, an excellent table of integrals, a table of answers, and a good index that renders the book a convenient work of reference. The method of limits is employed exclusively. The notion of integration is introduced at an early stage, and topics are in general arranged in the order of increasing difficulty, such topics as infinite series, expansion of functions, singularities of plane curves, envelopes and the like being reserved for treatment when the reader shall have had time to confirm his grasp of fundamentals. It is especially noteworthy that the book is a joint product of a professional mathematician, who is chiefly responsible for the theory, and a professional teacher of mechanical engineering, who is largely responsible for the practical aspects of the work. Indeed, the applications of the subject are about equally distributed between geometry and mechanics, a fact that should be of interest to the student of engineering, though the book is by no means written for him alone.

Professors Woods and Bailey's book is the first volume of a work in course of preparation which is designed to present together—that is, in a single course—so much of algebra, analytical geometry, calculus and differential equations as is usually required of engineering students in the first two years of their professional study. The attempt represents a wholesome reaction against the long-prevailing practise of presenting these subjects in as many separate courses, and of thus incidentally giving the student the impression that the several doctrines are essentially insulated and independent, instead of being, as in fact they are, but different parts of one complicate instrument or different organs of a single body of doctrine. The experiment sufficiently commends itself *a priori* to deserve a fair trial, though this will not be easy in view of the readjustment of programs and schedules necessarily involved. The danger of the reaction lies, of course, in the opposite extreme, namely, of so presenting a group of interpenetrating disciplines that they shall produce the effect of a mere *mélange*.

Professor Schultze's "Graphic Algebra" is an excellent introduction to the plotting of equations and therewith to the graphical representation of functional dependence in general. The method is illustrated in connection with equations of the first four degrees in two variables. An appendix extends the method to other than equational relationships, and furnishes for practise some tables of data drawn from a considerable variety of fields. The book is timely and should be interesting to many, for this is indeed the age of coordinates and graphical depiction, the method long familiar in analytical geometry having proved its availability in almost every field of study, including even the critical study of biblical literature.

Professor Johnson's "Integral Calculus" treats more fully than his earlier one on the same subject of reduction formulæ and of multiple integrals. It contains, besides, new chapters dealing with mean values, probability, definite integrals (including the Eulerian),

Fourier's series and other topics, including functions of the complex variable. There are numerous references to the author's "Differential Calculus" which is essential to the reading of the present work. Both treatises are based on the method of rates and both enjoy both the advantages and the disadvantages that attend adherence to that method. The work will serve, too, as a welcome auxiliary to Professor Johnson's well known and widely used "Differential Equations."

C. J. KEYSER

COLUMBIA UNIVERSITY

SCIENTIFIC JOURNALS AND ARTICLES

The American Naturalist for April is devoted to a symposium on "Aspects of the Species Question," being the papers presented at the January meeting of the Botanical Society of America, by Charles E. Bessey and others. The aspects are taxonomic, physiological and ecological and the views of the various authors are naturally more or less colored by the nature of their work. Many will thank C. L. Bristol for his quotation showing the origin of the "Otter Sheep," as information of this kind is most difficult to lay hands on. One may know the general facts and yet be unable to give a definite reference to them.

BIBLIOGRAPHIES are always welcome, and the "Index to Hull (England) Museum Publications, Nos. 1–47," will be of much service in facilitating reference to the many objects in the Hull Museum described during the past six years.

The Museums Journal of Great Britain has a description, by E. Howarth, of "The School Museum System of Sheffield" with details of the circulating collections, stereoscopic views and lantern slides for loan to public schools. The cost of the individual "cabinets" in these collections was stated to be from $25 to $75 each, which must be regarded as a pretty liberal sum.

THE *Reports relating to Alaskan Seal Fisheries,* recently issued by the Department of Commerce and Labor, contain much interesting information in regard to the seals of the Pribilofs, and the Arctic fox. The seal herd has steadily decreased, owing to pelagic sealing and the total number in 1907 was only about 172,000 as against 400,000 in 1897. The greatest destruction is now wrought by the Japanese, who are not bound by any agreement, seal up to the three-mile limit (sometimes within it) and use shot-guns which cause great loss and waste. Owing to the adoption of certain restrictions proposed by the government agents the proportion of active young bulls has increased.

THE *First Biennial Report* of the Louisiana State Museum, covering the period December 10, 1906 to April 1, 1908, has just been issued. It gives a brief account of the origin of the museum and includes a general catalogue of the exhibits of the various departments. These include a fair representation of the fauna of the state, a considerable proportion of commercial products and some extremely valuable and interesting historical material. It is to be hoped that this museum may receive substantial support from the state.

SOCIETIES AND ACADEMIES

THE GEOLOGICAL SOCIETY OF WASHINGTON

AT the 205th meeting of the society, on April 22, 1908, specimens of "coal bombs" from Walsenburg, Colo.; Las Cerillos, N. M., and the Pennsylvania anthracites were exhibited by David White, who remarked that these nodule-like masses from the midst of coal beds often show a combination of slickensiding and concentricity of structure suggesting tension in one plane rather than pressure in all directions. Such nodules or bombs, found in coals of varying age and kind, are probably more frequent than would be supposed from their rare mention in the literature.

Regular Program

Mineral Deposits of the Cerbat Range and Black Mountains, Mojave County, Arizona: Mr. F. C. SCHRADER.

The Cerbat Range and Black Mountains are two desert ranges situated about twelve miles apart in the northwestern part of Arizona, southeast of the Big Bend of the Colo-